Special Paper for Tennessee Beekeepers

I was honored (and SURPRISED) in October when the Tennessee Beekeepers Assn. presented me with a KEY to the City of Oak Ridge plus a Certificate of Honorary Citizenship, just because I was sent by the Army in 1944 to X-10 Laboratory to work as a scientist to purify plutonium. I only had 30 colonies of bees at that time, and I had taught my father how to look after them while I was serving our country and "winning the war". Hence, being a "two-way street", I thought I might surprise you with some knowledge about how to have a record crop of honey, diminish swarming, and save the bees from some "mysterious" unknown death.

Many know that BREVITY is not one of my virtues, so this will be a l-o-n-g paper. Some know that, as a typical scientist, there is no "gray area"; but everything is either "black or white". I am BLUNT, not to hurt your feelings, but make you MAD so that I make you THINK!

This year of 2001 begins my 69th year in scientific beekeeping, having kept 8 different races of bees to PROVE which was the best race for the Maryland suburbs of Washington, DC, having worked with the Africanized bees in South America, and having made talks and demonstrations at the request of various associations over most of the U.S. and some overseas. During most of these years (until I suffered several strokes), I kept about 135 colonies and produced between 10,000 and 12,000 pounds of honey each year; and although I did not need the money, I learned how to sell the honey that averaged 132 pounds per honey production colony each year.

Unfortunately, with the exception of better control of American Foul Brood done by the state bee inspection laws started in 1922, there really has not been many changes in beekeeping during this century past. In fact, up until 15 years ago when the tracheal mite was first found in the U. S., bees were kept "just like Daddy kept bees". But DADDY did NOT have mites, Africanized bees, PMS (parasitic mite syndrome), small hive beetles, viruses, or the almost universal public FEAR of a bee sting. Today, in 2001, we have all of these beekeeping problems PLUS there are almost no feral bees left and new queens are being badly superseded; and this has resulted in a major reduction of bee colonies in the country and many less beekeepers. American beekeepers, always very independent and resistive to any change in long used established procedures, simply REFUSED to accept any treatments recommended by scientists, but used "homeopathic" substitute "medicines" or time of treatment; and this resulted in the death of their bees, cost of annual replacement, and discouragement to the point that they gave up beekeeping or changed over to raising pigeons, growing tomatoes, or capturing butterflies. During these past 15 years most of us have many "new" things that "Daddy" never had, or used, like: microwave oven, computer or word processor instead of a typewriter, mobile phone, fuel injection rather than a carburetor on your car, no-till farming rather than constant hoeing, e-mail instead of 33 cent stamps, getting cash with an ATM card rather than going inside a bank, and let's not forget organ transplants. TIMES CHANGE and THINGS CHANGE, and you have a choice: Either fall behind the rest of the world or LEARN and USE the new material or program. I don't think you are the type to ask your friendly neighborhood butcher to remove your appendix, or ask the service station gas jockey to repair the "blown" automatic transmission

in your Sunday Cadillac. That being the case, there is no reason to try and keep bees "like Daddy kept bees" or take suggestions from other neighboring beekeepers who has probably had to buy new package bees to replace the dead colonies that he has suffered for several years.

Lastly, before I tell you the new things necessary to upgrade your beekeeping, let me tell you about READING MATERIAL or BOOKS. Since almost every new beekeeping problem has surfaced within the past 15 years: tracheal mite in 1984, Varroa mite in 1987, Africanized bees entering Texas in 1990, small hive beetle in 1998, then no book published prior to 1984 even mentions these items because they were unknown in the U.S. Since it takes several years to investigate these new problems and recommend treatment plus the year or so for publishing this work, it is pretty fair to say that regardless of the acceptance of a book or fame of the author, a book is more or less OBSOLETE if it was written much before about 1992. In that regard, I believe that the 1992 REVISED EDITION of the HIVE AND HONEY BEE written by perhaps the worlds 31 best bee scientists and professional beekeepers and published by Dadant might be the finest bee book ever written.

All is not lost as we enter this new millennium, because many very important things have been discovered in these past 15 years due to the feverish work done by the bee scientists, researchers, queen breeders, and extension agents to overcome all of these new problems. In spite of the difficulty of funding money for research, the problems caused by the mites, Africanized bees, and public fear of being stung FORCED research to be more specific about securing gentle bees, swarm reduction, and requeening with a specific stock of honey bees rather than allowing the bees to requeen themselves. These very things are encouraging people to UPGRADE their knowledge about beekeeping. As an "old" scientist, I predict that research done in the 21st century will redirected to determine more about honey bee PHEROMONES, and armed with these new findings about the part played by pheromones in the life of honey bees, the results will be better beekeeper management, improved handling techniques, healthier bees, and higher crop yields! I am jealous of that future that perhaps I will never see.

My home is in Maryland just 15 miles north of the WHITE HOUSE in Washington, DC, so I can't talk to you about specific dates in seasons, but I will use general terms and you will have to interpret the time or month it fits into your area whether it is Knoxville, Nashville, or Memphis. My Maryland weather is close to that of Oak Ridge, Saint Louis, or San Sacremento where we have a cold, but short winter, a very early major nectar flow from April 15 to June 15 and almost nothing afterwards until possibly goldenrod in September. No saleable honey is made in Maryland after June 15th, so timing is very important, because all the crop has to made in less than two months shortly after a cold winter. However, what I am about to say is true regardless of your location.

WHAT ARE THE ABSOLUTE NECESSITIES TO MAKE A GOOD HONEY CROP?

A) Healthy bees with little or no mites, Nosema free, and a YOUNG vigorous queen
B) A surplus amount of DRAWN COMB in the supers just before the nectar flow
C) A very large number of foraging age bees available at nectar flow time
D) Elimination of those conditions that cause swarming

ITEM A) - A YOUNG VIGOROUS QUEEN - More and more highly successful beekeepers have started to requeen every 12 months to attain larger honey yields, some migratory operators even requeening twice a year. Because of Maryland's very early honey crop, Steve Taber convinced me 52 years ago in 1948 to switch from the Italians I had used for 15 years to Carniolans in order to take advantage of their renowned "explosive" early spring buildup. Unfortunately, the Carniolan is equally well known for its high propensity to swarm. Recent bee research has PROVEN that in addition to the egg laying ability of a queen, her production of the queen pheromone is of vital importance in swarm prevention. Among other things, the pheromone is the "glue" that binds thousands of worker bees into one single functioning unit; but the queen's ability to produce that pheromone diminishes a little each day from the day of her mating. Hence, although a second season queen might be able to produce 1500 eggs per day, but NOT being able to produce enough queen pheromone to bind this large group of workers into a single functioning unit, the bees swarm, and a good honey crop is lost. Researchers have shown that a second season queen is three times more apt to swarm than a first season queen. It doesn't make good sense to take a chance on losing a 100 or 200 pound honey crop because you were too cheap to requeen with a high quality queen that costs $10. Further, I much prefer September requeening rather than spring requeening, because the queen can arrive in the mail at my house on the exact date that I ask, the queens are better bred because of better larval feeding, the presence of more drones for breeding, and the queen breeders are not under that intense spring pressure of getting lots of queens delivered "yesterday". Further, perfectionist that I am, the Imirie Requeening Method (described at the end of this paper) guarantees almost 100% acceptance plus it has BOTH the old queen and the new queen laying in the same colony for about 6 weeks in September and October which builds a large group of young worker bees to enter the winter inactive season!

HEALTHY BEES with little or no MITES (tracheal or Varroa) - Contrary to what some people think, the tracheal mite (acarapis woodi) is STILL HERE in the U. S. Since it is microscopic and hence not seen by humans, the bees are assumed clean and not infected by this pest. When the colony is found dead, usually in January, with just a few dead bees in the hive, but plenty of honey still present, generally the tracheal mite has "won" again. Of course, the beekeeper blames the death on El Nino, cold weather, high wind, lousy queen, or the revenge of his mother-in-law; and to further confuse himself and neighborly beekeepers, he does do not perform an autopsy on the dead bees because he doesn't have a microscope or know the technique to look for tracheal mites. The technique of isolating the trachea of a bee is easy to learn, and the gift of a pound of honey to the high school science teacher will usually allow you the use of a microscope to be an "apian forensic scientist". It would have been so much easier (and cheaper too) to PROPERLY TREAT and KILL the tracheal mites before they overwhelmed the worker bees in December or January. Just put 50 grams of Menthol (cost about $1.50) on top of the brood chamber frames in WARM or HOT weather, which is probably August, but no later than September 15th. Now hear this: Menthol does NOT work at temperatures lower than about 84 degrees, because menthol sublimes (change from a solid into a gas) at a temperature of 84 degrees! There are lots of beeHAVERS out there, who not wanting to lose any of their August or September honey crop installed Menthol in October and their bees died. Of course, they told everyone that Menthol treatment does not work. Menthol DOES work, and it KILLS tracheal mites, but it has to be used at the right time, not when it is convenient for you. Although Menthol is the approved government treatment for tracheal mite treatment, Dr. Diana Sammataro

has pioneered the use of PLAIN (no Terramycin) grease patties to CONTROL the degree of tracheal mite infection in a colony so that the mites are not strong enough to kill the bees. The grease patties do NOT KILL the mites, but "confuses" the mite in selection of a host bee to infect. Unfortunately, the use of grease patties is labor intensive in that they must be used CONTINUOUSLY (without interruption) from mid summer to early winter. However, they can be used even during a nectar flow. Grease patties are made by mixing 2 pounds of granulated sugar with 1 pound of Crisco, make into hamburger size patties on a piece of wax paper, and place the patty on top of the brood frames. I have used Menthol on August 15th on up to 100 colonies for over 10 years and have never lost a colony to tracheal mite infection, whereas other neighboring beekeepers who ignored the proper timing of application, lost many colonies. Early in 2000, the government approved a second chemical, APICURE, for the treatment of tracheal mites, but unfortunately it was recalled because the plastic package developed leaks. I hope APICURE will be available in 2001, because it can be used at temperatures less than 84¡, and hence could be used in September or October perhaps.

The VARROA MITE - Far worse than the tracheal mite because it multiplies so rapidly, but at least, it is not microscopic and can be easily seen. One should thoroughly understand the LIFE CYCLE of the Varroa mite to properly control the mite infection of a honey bee colony. UNLIKE the tracheal mite which lives almost its entire life INTERNALLY in an adult bee, the Varroa mite is born with a bee larva, matures to adulthood nursing itself on the honey bee pupa in its capped cell, emerges into our world when the new honey bee emerges, and then attaches itself to some adult bee and lives externally on that bee eating the hemolymph (blood) of that bee. Hence, the greater the number of honey bee LARVAE and PUPAE in a colony, the greater there is a source of food for the varroa mite to multiply! (That is a VERY IMPORTANT fact that you should know!) Further, the female mite usually lays 2, 3, or even 4 female mite eggs in one bee larva cell, meaning that as every new bee emerges from its capped cell, maybe 2, 3, or even 4 new adult female mites might accompany the bee into the bee society. It should not take rocket science thinking to understand that the most effective time to kill mites is when there is little or no bee brood (November 15 to December 31 in MD), and this allows healthy, non deformed bees to be "born" in late winter and early spring. In Maryland, brood production is being shut down rapidly beginning about October and generally is stopped by November 15th. Hence, I place 2 strips of Apistan in each brood chamber on October 1st and ABSOLUTELY remove them on the first 45-50 degree day after November 15th. Leaving strips in a colony more than 6-8 weeks leads to the creation of mites resistant to Apistan, and a beekeeper who would be this inconsiderate of other beekeeper's bees, or just too lazy to remove the strips, should be publicly tarred and feathered as well as named on nationwide e-mail if it was my decision to make. We have already lost a wonderful miticide, Miticur, due to a group beekeepers who thought they knew more than the scientists and just plain ignored the printed rules for the proper use of Miticur. It would appear that the same thing might be happening now in the use of Apistan, as we have heard of a few isolated spots that Varroa mites are apparently resistant to Apistan.

Bee research has positively shown that Varroa mite growth is temperature dependent, meaning that in those areas that have the LEAST winter and cold months, Varroa mite growth is enhanced. Honey bee colonies in places known for warmth like Texas or Florida might have to be treated with Apistan 2 or even 3 times each year to control mites, whereas colonies in the

colder climates of New York or the Dakotas probably require only one treatment each year. In any event, DON'T GUESS AT THE MITE INFECTION OF YOUR COLONIES - TEST FOR MITES IN MARCH AND JULY. Being a scientist, I don't like doing anything half way, and hence I don't like the ether roll test, so I make a STICKY BOARD test on all my colonies on March 1st and particularly July 1st. There are many, many cases reported in the literature that a colony of bees that had been treated the previous year with Apistan, made a record crop of honey in late spring and early summer, but wasfound dead of massive Varroa mite infection in August. If I lived in an area that had a nectar flow from summer clover or alfalfa in July and August, but my July 1st test for Varroa was high, I have a decision to make: Do I NOT treat and take a chance of losing the colony, or do I remove all supers for just 2 weeks, make an quick emergency treatment with Apistan for 2 weeks, and re-super? The cost of new bees and aggravation of building up a new strong production colony is much greater than cutting my honey production back maybe 25-50%, so I would make the 2 week Apistan treatment, do a regular 6-8 week Apistan treatment in the fall, and save my bees for next year. People seem surprised when I say "TEST" for mites. Gosh, you test yourself with a thermometer for a fever, the doctor tests your blood pressure, the optician tests your eyes, the vet tests your dog for worms, you test your garden for the pH of your soil, pray tell me why you won't test your bee colony for mite infection that is going to kill your bees unless the mite population is controlled? You can't keep bees like Daddy kept bees any more! You MUST CHANGE to be successful!

NOSEMA DISEASE - This important disease, although rarely killing a colony, weakens the health of the bees that shortens their lives dramatically and reduces their activity so they just can't make a good crop of honey. Nosema is a disease of the gut and causes the bee to suffer diarrhea. I ask you - How much work can you do when you have the "runs"? Researchers have estimated that approximately 60% (over half) of all the bees in the country suffer some Nosema disease in the spring after a winter confinement, but treatment is generally ignored. For the cheap price of about $2 per colony, you can feed a colony 2 teaspoons of Fumidil-B dissolved in 2 gallons of 2:1 sugar syrup in late fall, and your bees will be free of Nosema disease next year. I don't take any chances of hurting my honey crop, so my colonies get the $2 Fumidil-B treatment every fall. Regardless of the price of honey, $1/pound or $4/pound, my healthy bees make more pounds of honey for me to offset the cost of the Fumidil-B treatment.

Item B) SURPLUS AMOUNT OF DRAWN COMB in the supers before the nectar flow. First, I will talk about the WHY, WHEN, and HOW of installing supers of DRAWN COMB for extracted honey production. The use of foundation or anything that requires comb building is a totally different program, and I will talk about that separately. However, I want to impress upon you at this time that foundation can NOT be used as if it were empty drawn comb, nor can you mix foundation and drawn comb in the same super without bad results.

Fix in your mind that it is not HONEY that foraging bees bring home; but bees collect thin, watery nectar, temporarily store it until they get the time to ripen it into thick, viscous honey, and then store it in capped cells.

When a nectar flow gets under way and improves, swarming season is OVER and the bees mentally shift programs from swarming for reproduction purposes to nectar collecting to make honey for winter feed. However, if there is not enough super space for the bees to store all

of this thin, watery nectar (maybe 20 pounds per day) until they have time to ripen the nectar to thick, viscous honey, they are going to SWARM. A swarm during a nectar flow is 100% FAULT of the beekeeper in failing to provide enough super space when needed; and is totally different than a swarm in swarming season which is caused primarily by brood chamber congestion. In Maryland, I know that a nectar flow is going to get underway in mid to late April, so I put ONE super of drawn comb in place early, about April 1st, followed by 4 more supers of drawn comb put on ALL AT ONE TIME about May 1st. Research, notably by Dr. Tom Rinderer of Baton Rouge Lab, has proven that the hoarding instinct of honey bees makes the presence of lots of drawn comb a challenge to the bees and they work harder and faster producing a higher yield of honey than having empty drawn comb supers added one at a time as needed. I use 5 or sometimes 6 supers, because I know that my bees will normally produce 3 full supers or maybe even 4 supers of capped honey during that major nectar flow; but they need the space of at least 5, or maybe 6 supers, to store all that thin watery nectar until they have time to evaporate the water from the nectar to convert it to honey. Some will say, "I only have 3 supers, why can't I just extract the bottom one and use it as the 4th empty super, etc?" It takes a lot of time for the bees to fully cap all ten (or nine) frames in a super, and if you extract uncapped honey, that honey is not yet ripe and may ferment. After all my time and hard work, I am not going to let the cost of 1 or 2 supers cause my bees to swarm, thereby losing some of my honey crop and maybe the bees. Hence, when I planned on increasing my colonies from 50 colonies to 60 colonies, I bought 50 more supers, so each of the new 10 colonies had at least 5 for use every spring; and I rarely had a swarm.

HOW TO INSTALL SUPERS OF FOUNDATION - Using foundation requires less supers for the same amount nectar collection than using drawn comb, because the bees have to eat about 8 pounds of honey (equal to maybe 30 pounds of nectar) to develop the energy to produce and construct one pound of wax comb! Further, using foundation requires more labor time and frequent inspection to establish the need for another super. Bees, in their genetic way, can't think like humans or change like humans (I hope you can) and hence do things in the same manner of their ancestors back with Adam and Eve in the Garden of Eden. All bees work within the limits of what we call BEE SPACE, the discovery of Dr. Langstroth that enabled him to develop the first removable frame hive. Bee Space is about 5/16", which is the travel space for a bee, meaning that they will build comb or fill up spaces smaller than 1/4" or larger than 3/8". This concept is very important in drawing foundation into comb! Even if you prefer and use only 9 frames in a body, you must use 10 frames of foundation to build the comb, or you will have a mess because you violated "bee space". This is the same reason that you cannot mix drawn comb frames with frames of foundation in the same super, nor can you install 4 or 5 supers of foundation all at the same time, because the bees will build comb in the strangest of places and you will have one great big mess that you cannot separate and the foundation is totally ruined. The only proper way to install supers of foundation is to put just one super of 10 frames in place, wait until about 6 of its center frames are drawn and partially filled with nectar, reposition those frames by moving the filled frames towards the outer box walls and placing the undrawn frames in the center. At that point, put the 2nd super of 10 frames of foundation on top of the 1st super, and so on for the 3rd and 4th supers. Redundantly, I say getting foundation drawn into comb requires more of your labor time and a lot more inspections to determine the correct timing for another super installation. I want to point out an absolute fact here that beeHAVERS just don't seem to understand: There is NO WAY that you can make bees draw

foundation unless they have an immediate need for a wax cell, such as storing nectar, pollen, or a place for the queen to lay an egg, and therefore, there MUST, and I repeat, there MUST be a nectar flow on (or a sugar syrup substitute) for bees to draw foundation! I cannot overemphasize this fact!

Another point: Collecting swarms at a time of year AFTER the main nectar flow often is a waste of time and money, because the old queen is probably going to be superseded rather soon anyhow, and you will probably have to feed a LOT of sugar to get them through the winter, etc., etc.; but I ALWAYS get in my car and go out to collect a swarm. Why? A swarm has no home, but more important is that it has NO COMB and has to build comb in a hurry so it can survive. Hence, I catch a swarm, put it on 10 frames of foundation, and feed it heavily with 1:1 sugar syrup for the sole purpose of drawing that foundation into drawn comb for use next year. I usually divide up bees and brood among other colonies and destroy the queen.

Another point: I never feed honey to bees. Sugar costs about 30-35 cents per pound, whereas I can sell honey for at least $3.50 per pound. A swarm is desperate for food that they have to consume to have the energy to produce wax and construct comb. Remember, bees have to eat 8 pounds of honey to make one pound of wax.

Item C) LARGE NUMBER OF FORAGING AGE BEES AVAILABLE AT NECTAR FLOW TIME Many apian followers don't understand that from the day a worker bee egg is layed, 40 days (almost 6 weeks) elapses before that worker bee makes its first nectar gathering flight! 40 DAYS! Why? The gestation period of the honey bee is 21 days, and its genetically programmed life has it doing "house duties" like comb building, nursing larvae, pollen packing, ripening nectar into honey, and serving guard duty at the hive entrance for the first 18 days of its life before it ever makes its first nectar gathering flight, which occurs on the 40th day after the egg was layed. For example, in Maryland, if the black locust bloom opens on April 25th, the egg of the bee that forages for that black locust nectar has to be layed 40 or more days before, or March 15th at the latest, when there might have been 6 inches of snow on the ground and baseball season has not yet opened. If you came to this meeting to LEARN, and I hope you did, then don't you ever forget the importance of this particular 40 days that may decide the yield of your honey crop!

Most people don't understand how to get a queen to lay eggs in the cold weather of February. Let me shock you! The queen does NOT make that decision! Her daughters, the worker bees, make almost all colony decisions and they totally control the queen's actions by how much they feed her, how much comb they build, and how many cells they CLEAN AND POLISH to receive her eggs! Further, worker bees won't do any of these things until there is pollen and nectar for food! In walks Mr. Smart Beekeeper, who creates an artificial nectar flow by feeding 1:1 sugar syrup (1 pound of plain sugar dissolved in 1 pint of water) and even supplies a pollen substitute like Mann Lakes Bee Pro. When these artificial nectar and pollen substitute are put in a hive, as I do about February 1st, the worker bees are fooled in to thinking that "early spring" is here, the strong nectar flow will soon start that will supply next winter's food, so "we gals better wake up our queen and get her laying eggs in a bigtime way". They start eating large quantities of the 1:1 sugar syrup, ignoring all that stored honey that is like emergency "hard tact" compared to thin delicious nectar. (You did not know that nectar is the

bees choice of food rather than honey, did you?) Eating all these calories and microscopically exercising raises the body temperature of the bees so they can warm the brood area to a maternity room desired temperature of 91-96 degrees, start "stuffing food down the queen's gullet" which activates the queen's egg laying "apparatus", and finally clean and polish cells into which the queen can lay eggs. Early spring population increase has been started in the cold of February and snow may be all over the hive tops! Feeding this 1:1 sugar syrup continues well into dandelion time to keep that queen laying.

ITEM D) ELIMINATION OF THOSE CONDITIONS THAT CAUSE SWARMING - First, let me point out that swarming is the natural program of honey bees for two purposes: to increase the population of honey bees over the world, and for bees to spread away from home into new territory, thereby providing pollination throughout the world. Back in the 19th century, the lack of sound knowledge about swarming often made it necessary to maybe 10 colonies in order to produce a total of 100 pounds of honey each year. The main goal of the 20th century bee scientists and professional apiculturists has been to determine the primary reasons for swarming and formulate colony management techniques to either prevent or diminish the tendency of bees to swarm. Much helpful knowledge has been made particularly in the last 50 years to control swarming so that a colony can be expected to produce 100 pounds or more of honey year after year in most parts of the country. The following points have been firmly established:

a.) There is a definite SWARM SEASON for all apis mellifera ; which is generally defined as that period in the spring when brood rearing is at its peak, which, in most areas, is the 4-6 week period just ahead of a major nectar flow.
b.) Some races of apis, notably Carniolans, genetically have a higher propensity to swarm than other races. The same can be said about different stocks (strains) of the same race. Swarming may not be a problem for a skilled beekeeper, but can be a major problem for the unskilled or careless apiarist.
c.) (This will surprise you.) The Number ONE reason for swarming is congestion in the BROOD CHAMBER! This has nothing to do with any activity in the supers, which is a totally different problem.
d.) (This will also surprise you.) The Number TWO reason for swarming is the age of the queen. In addition to laying eggs, the queen has to be able to produce enough queen pheromone to "glue" or seal all of 40,000 - 60,000 progeny together as one single functioning unit, and her ability to produce that pheromone diminishes a little each day of her life. Colonies headed by a queen less than one year old rarely swarm, if the beekeeper has eliminated all other causes of swarming.
e.) It is NOT natural for bees to swarm during a nectar flow, because, in doing so, they are leaving the very thing that they are working so hard to collect to provide for colony survival in the coming winter. However, there MUST ALWAYS BE enough super space to temporarily store the thin watery nectar until the bees can evaporate the water from it and ripen it into honey. If the space is not available when they need it, they will swarm.

Many beekeepers have concluded that swarming is a "sudden happening", or that there are few warning signs for the beekeeper, and therefore, swarming is just one of those unfortunate

problems in beekeeping. None of this is true? When the BROOD AREA becomes badly congested with nurse bees feeding larvae, little or no nectar or pollen storage space available, foraging age bees pushing their way to and from as they travel out to forage, and PARTICULARLY no laying space for the queen, the bees initiate their swarming program which is not difficult to recognize if the apiarist knows what to look for. For a period of up to 12 days before a swarm issues, bees have to build swarm cells, produce lots of royal jelly to feed this potential new queen larvae, reduce or even stop feeding the queen (and hence egg laying) so she reduces weight in order to fly with the swarm, send out scouts looking for a nearby place to have the swarm cluster in order to organize, and finally gorge themselves with honey to carry along to their new home. Hence, not much work is done "out in the field" and the bees just sort of "hang around" the hive waiting for the "signal" to swarm. This is the swarming program done in SWARM SEASON before a nectar flow.

Swarming during the nectar flow is NOT caused by brood chamber congestion, but caused by lack of super space to store the incoming nectar. In this case, the bees will build burr comb in any space they can find that is not travel space and fill it with nectar.

What techniques are used to try and prevent swarming? In the SWARM SEASON prior to the nectar flow, the most important thing is to provide the queen laying space and diminish brood chamber congestion by REVERSING THE BROOD CHAMBERS. Since creation, the rule of "food over brood" simply means that genetically bees like to move UP as they eat the honey stored above them and when they run out of space ABOVE for the queen to lay eggs, they swarm, even though the lower frames may be empty. Hence, the beekeeper REVERSES the two brood chambers so that the bottom chamber which is almost empty of brood is now the top chamber and the queen can just go right up and lay eggs. Depending on many different things, you might have to reverse brood changes only once or twice each spring, or maybe 4 or 5 times each spring. See REVERSING at the end of this paper for details. Further, a week or so before a nectar flow starts, put a super on top of the brood chambers, so that bees can begin to store incoming nectar in the super rather than take up queen laying space below.

To prevent swarming during a nectar flow, for the umpteenth time I say have lots of supers installed AHEAD of the need for storage space.

Lastly, maybe none of these things will prevent swarming if the queen is over 12 months old, because no matter how good her egg laying abilities are, an older queen just cannot produce enough queen pheromone to bind a large number of bees into a single working group. Hence, requeen every year so you always have a young queen.

SOME SWARMING TRUTHS AND FALSITIES:

1) For many years, beekeepers practiced removing all swarm cells about once each week to prohibit swarming, and many novices still try that today. Although that program may delay swarming, usually the swarm issues and leaves a QUEENLESS colony behind. Further, most often the beekeeper overlooked one queen cell when doing one of his removal procedures and the bees swarmed right on schedule. REMOVING QUEEN CELLS DOES NOT STOP SWARMING!

2) Many beekeepers clip a queen's wings so she cannot fly and believe that this procedure is a reliable swarm prevention technique. When the swarm bees discover that the queen is not part of the swarm, they disband and return to the hive with the idea of trying again tomorrow. This action may happen for a day or so, but usually a new virgin queen emerges from her queen cell and the swarm leaves the "old homestead" headed by a new virgin queen. Often the old clipped wing queen is lost or killed, so in addition to losing a swarm, the parent colony is left queenless. CLIPPING THE QUEEN'S WINGS DOES NOT STOP SWARMING!
3) Not unlike the addiction of some humans to alcohol or drugs, after the bees set their program into a swarm mode and perform many of their necessary PRE-swarm steps, it is extremely difficult to stop this colony of bees from swarming unless drastic measures are used. Such measures might include splitting the colony into two parts, removing the queen, removing all brood, and other labor intensive tasks, and even then, the colony might swarm anyhow. If you observe queen larvae floating in royal jelly in a queen cell, the bee's swarm program is nearing its final stages, and swarm prevention will be difficult. Finally, if you see CAPPED QUEEN CELLS, you can forget any swarm prevention procedures, because that colony will swarm within 24 hours unless the weather is bad. One might say that "bees have a one-track mind", and if they have made swarm preparations, it is very difficult to re-orient their thinking to some mundane task like nectar collecting.

HARVESTING HONEY - Honey should NOT be removed from the colony until it is close to 100% CAPPED with wax, because uncapped honey is not yet "ripe". The moisture content of unripened honey is too high allowing yeasts to grow, so the honey might ferment and spoil. Leave uncapped honey on the bees so they will ripen it and use it for winter stores. The warmer honey is, the easier it is to extract, so remove your honey in the summer rather than waiting until fall; and, also, then there will be no problem using Menthol when it should be used to kill the tracheal mites. There are about 4 different methods used for harvesting, but only two methods are fast and easy, while the other two methods are either too slow or cause stinging. Theoretically, by inserting a Porter Bee Escape in the inner cover hole, the bees will leave the supers through this one way device and enter the brood chamber; but the bees will not leave the supers unless they are chilly and want the warmth of the cluster below, so the Porter Bee Escape is not a satisfactory means of getting bees out of the supers except in Northern states. Most new hobbyist harvest the honey using a bee brush to brush away the bees off of a frame, and these bees can become very angry and reciprocate with a sting. You would too, if someone knocked you out of your chair with a broom. In these times of public fear of bees, don't upset your neighbors by making your bees mad, or you may find yourself facing a new town or county ordinance that says "Beekeeping is Prohibited in this Area". The best two harvesting methods are the use of a Fume Board with a chemical, or to use a $250 bee blower. If you can afford a bee blower, remove a super, stand it on end near the hive front, and blow the bees out of the super on to the grass. Unlike humans, bees don't get mad, because they do not understand that they are being robbed. I have a bee blower, but I much prefer to use the Fume Board with Chemical method. A fume board is much like a framed inner cover with a piece of absorbent cloth covering the inner cover face. Sprinkle one or two teaspoons of chemical all over the cloth, place the fume board on the top super cloth side down, wait 3-4 minutes, remove the super now empty of bees, and go to the next super. My partner, Ann Harman, and I use two fume boards

and we can remove 20 supers per hour, one each three minutes? What are these chemicals that are used on the fume board? The most well-known is BEE-GO, which is butyric anhydride that has an odor worse than rotten eggs, vomit, or skunk musk, and it does not wash away very easily; but it WORKS. Another name is HONEY ROBBER, which is nothing more than Bee-Go with the addition of Oil of Cherries to mask the odor of butyric anhydride, but it still STINKS! I much prefer benzaldehyde, which has the odor of oil of almonds, a very delightful odor; but benzaldehyde is very difficult to find. Both butyric anhydride and benzaldehyde work extremely well to remove bees from supers, and they cost about the same, but anything that contains butyric anhydride "STINKS" grossly, but most honey producers use it. I think Mann Lake Bee Co. might be the only supplier left still selling Benzaldehyde, because the Federal Taxes on all of these fume board chemicals is so high that most just sell Bee-Go.

PROTECTING YOUR DRAWN COMB - After you have extracted your honey, you have a sticky mess and drippy frames. Don't put them outside and start all the bees within 3 miles robbing and killing each other in addition to neighbors calling the police about your stinging bees. Before dark, select your strongest colony, remove the telescoping top but leave your inner cover in place, add a total empty hive body on top of the inner cover, and then put 5 or 6 of these wet drippy supers with frames on top of the empty hive body, put on the telescoping top and seal all cracks that robber bees might enter.In just a few days all of your supers and frames will be totally clean of honey and dry, and the drippy honey is all nicely stored away in the strong colony below, and nobody was bothered in the slightest. Now, what are you going to do with that DRAWN COMB?

DRAWN COMB IS A BEEKEEPER'S MOST VALUABLE POSSESSION, and yet beekeepers let the wax moths destroy it before next season. There is no excuse for this! Select the place that you are going to store these supers for the next 6-9 months, stack them 10 high with a teaspoon of para-dichloro-benzene (PDB) on the frame top bars of each super with 3-4 teaspoons on the highest super, cover the stack and seal the cracks between the supers with masking tape. The PDB might have to be replaced about monthly until the temperature stays below 45-50 degrees most of the time. Next April, or when ever you need them, just let the supers "air out" for 1-2 days before installation. Make sure that the chemical you use is para-dicloro-benzene, and can be found in some drug stores or hardware stores as a type of moth crystals or in urinal blocks used to deodorize men's urinals. PDB is NOT expensive and totally protects your drawn comb.

MARKETING HONEY - Unfortunately, most beekeepers are lousy salesmen and don't like "selling" in general, some even thinking it is the next thing to being sinful. In 67 years, I have never sold a jar of honey, creamed honey, comb honey, or a honey stick; but I am a powerful salesman of the DESIRE to eat George Imirie's Honey. Not only do I divide my extracted honey by color and source, but I sell chunk honey, creamed honey, cut comb honey, 4 x 4 section honey, honey sticks, and beeswax candles. Further, to "cover all tastes", I buy and sell the specialty honeys that I can't make in Maryland, like Orange Blossom, Tupelo, eucalyptus, sour wood, alfalfa, and blueberry; and I do this on the theory of "one stop" shopping. Informative signs cover my booth, e. g., "Never put Honey in the refrigerator", "Buy this National Honey Board Cookbook", "Buy now, we will hold, you can pick up later", "Buy this Christmas Gift today, put in your freezer until Christmas Time". You MUST have a nice

OBSERVATION HIVE which attracts the children, who in turn fetch the parents with money, and you willingly "talk yourself to death" about the life of a bee, and the importance of their pollination to human food supply. This helps the people that are frightened of bees because of the darn "killer bee" movies, and aids in their knowing how important our bees are. None of my honey is cheaper than $3.50/pound, and people come to my booth or my home and pay this instead of buying Sue Bee Honey at $2.59 at the grocery store. SELL YOURSELF AND YOUR PRODUCT KNOWLEDGE, NOT JUST HONEY!

WHERE DO YOU LEARN? - Our society is so different today than it was just a couple of generations ago when the bulk of people lived a rural life or in small towns. People did a lot of farming or gardening and bees were just a part of their lives; and you were taught "on the job" by your family, neighbors, and local people. Today the bulk of people are highly urbanized knowing little or nothing about farm life or agriculture; and thickly populated areas control the national vote directing the government to protect all people from everything from murder to a mosquito bite, from cancer to the common cold, training-on-the-job to trade schools, junior colleges, or universities. TIMES CHANGE, and BEEKEEPING HAS TO CHANGE WITH IT TO SURVIVE! The Federal Government has 6 bee laboratories spread around the U. S. staffed by scientists paid to research beekeeping problems and their solutions. Some universities still teach the sciences vital to beekeeping: biology, chemistry, biochemistry, entomology, virology, etc. State Departments of Agriculture employ Extension Agents to work on-site of agriculture products such as HONEY. Some of these scientists whose entire life evolves around our honey bees write detailed books that explain proper beekeeping procedures, tools needed, seasons to be used, management techniques, diagnosis and treatment of bee diseases, and how to work in harmony with the bee. I have already mentioned that it is these scientists that have done so much research these past 15 troubled years that have "kept us afloat" today with solutions for our problems (maybe not the best solution yet, but at least something that works fairly well); and now, almost every day, they are discovering some new finding of value in our search for better ways to KEEP bees. I have already stated that I think the 1992 REVISED EDITION of the Hive and Honey Bee should be every beekeeper's "bible"; but I want to mention what I think is the best beginners and novices (Roger Morse suggests "old timers" also) book ever written. It is the 3rd Edition (April 1998) of the BEEKEEPER'S HANDBOOK by Dr. Diana Sammataro. Not only are her statements accurate, but her drawings and sketches of "what is going on inside a hive" are so definitive, it is one of the finest books that I have ever read, and the price of $29.95 is not expensive. Diana is best known as the pioneer or discoverer of the use of grease patties to control the tracheal mite, and her photographs and even movies of these microscopic critters taken with an electron microscope are mind boggling.

ENDING NOW (finally! some might say) - There is little written by me without injecting a strong personal feeling. In taking care of my 50 or more colonies, I haven't worn gloves or a bee suit more than a few times in the past 40 years, and usually work in a Tee-shirt and no veil. My county sponsors the largest agricultural fair east of the Mississippi lasting 9 days and drawing over a million paying attendees. Inside a screen booth that has a pair of two story colonies of live bees, I put on 4 demonstrations each day of opening these hives, describing all the "happenings" inside the colonies, finding the queen and taking her over close to the audience of 100 or more at each demonstration so they can view her closely; and I am constantly talking into a microphone tied around my neck about bees, beekeeping and pollination. I do this dressed

in a T-shirt and shorts with no veil, and I have only been stung a few times while doing this for over 10 years. Then, of course some people put on exhibitions of bee beards, but that does not allow the person to talk and move around as I like to do. Is this trickery? Do we get PAID? Are we CRAZY? The answer is emphatically, NO! We are good students of BEE BEHAVIOR, who have learned "HOW A BEE THINKS" and have eliminated all ANTHROPOMORPHIC thinking about bees. Most readers go to Chapter 8 in The Hive And Honey Bee entitled "Activities and Behavior of Honey Bees" written by the eminent entomologist, Dr. Norman Gary, and say to themselves "This is boring stuff, I just want to get to the part that tells me how to get more honey", and skip reading the chapter. They might remain a beeHAVER the rest of their lives, never learning about BEE BEHAVIOR and hence not able to appreciate KEEPING bees. I strongly urge every person to read the words of Dr. Gary, and when you throw away your ANTHROPOMORPHIC thoughts and understand BEE BEHAVIOR, only then will you find the real JOYS OF BEEKEEPING!

George W. Imirie
EAS Certified Master Beekeeper

Many of my Monthly "George's Pink Pages" can be found on the Internet at:
For older ones: http://www.cybertours.com/~midnitebee/ (click the lower right image)
For newer ones: http://www.beekeeper.org/george_imirie/index.html

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REVERSING: It is well known and almost totally accepted that Reversing of brood chambers is one of the most helpful of swarm prevention techniques; and if your bees swarm in April or early May in Maryland, you have basically lost your honey crop for an entire year. However, many, many people seem to have lots of problems figuring out just how to reverse, when, and how often; so I am going to try to explain it in writing (it is easy if we were inspecting one of my colonies together and then I could show you and explain as we did it)

It has been well proven that one of the strongest reasons for swarming is CONGESTION IN THE BROOD CHAMBER - Note, I said BROOD chamber, and nothing about super space. Let me stop here and make you think. It is late January, February, or March, the weather is cold or chilly, but the brood must be kept at 91-96 degrees to stay alive, bees like to keep nectar close to the brood for easier feeding, so the brood area is highly congested with lots of nurse bees feeding brood and warming the brood nest. Meanwhile, the old foragers are bringing in needed pollen from skunk cabbage, maples, and alders. If there is no 1:1 syrup, but just honey, bees have to fly out and find water to dilute the honey to nectar consistency for brood food. This whole scene is just a mess of congestion, which is the number ONE cause of swarming.

Back in November, the worker bees began storing honey near the top of the colony and driving the queen down to the bottom hive body for any brood laying that she might do; and hence initial clustering of the bees as the weather moved down into the 40's or 30's was around the queen on the frames of the lowest hive body. Just imagine a cluster of packed bees about the size of a basketball or soccer ball enveloping most of frames #5 & #6, some of frames #4 & #7, and smaller portions of frames #3 & #8. As the winter progresses, the bees slowly move UP (not sideways) and by January, they have consumed most of the stores in the lower frames and are now starting to eat the stores in the frames of the top hive body (regardless of whether you are using 2 deep bodies for brood chambers or 3 Illinois Bodies (like I use) for brood chambers.

It is Nature's Way or Bee Behavior that bees like to move UPWARDS, and more or less have to be FORCED DOWNWARDS. Hence, when the space in the upper frames is filled up with brood or honey, even though there is plenty of empty space in lower frames, the bees and particularly the queen resist moving their brood rearing to the lower frames. Hence, the worker bees either stop the queen from egg laying, or even prepare to swarm. Therefore, it becomes the BEEKEEPER'S task to reposition the frames so that there is always empty laying space ABOVE where the queen is laying. However, the position of the frames that contain brood is VITALLY IMPORTANT before you start Repositioning those frames.

To aid you in trying to picture brood location in a colony, I want you to think of a big round CLOCK in the place of All (either 2 or 3) of Frames #5, where the number 12 is close to the inner cover and the number 6 is close to bottom board. Draw an imaginary line through the 3 & 9, and that indicate the space between the bottom hive and the top hive if you are using 2 deep bodies, or the center of the middle body frames if you are using 3 Illinois bodies. It is most important that you understand where this 3 to 9 imaginary line is for my written explanation of REVERSING.

Upon examination, if about 80% of the brood is in UPPER frames and the remaining 20% brood, probably capped, is in the LOWER frames, REVERSE the positions of the top body with the bottom body. You might have to do it again in just 7 days or maybe not for 17 days depending on the weather, the age of the queen, the size of the frame, the race of the bee, and a dozen other reasons. However, you open the colony, examine the location of the brood as well as the empty space, and decide whether to reverse bodies that day or wait 2-3 days. Obviously the beeHAVER won't do as well as a knowledgeable beeKEEPER.

I start reversing in late January (late February might be best for most readers) and continue it until the nectar flow is strong, usually about May 1st. I usually make about 4 or 5 reversals of a colony in that period of late January to May; but many beekeepers using 2 deep bodies as brood chambers get by with just 2 reversals. However, since I don't want to contend with any swarming problems, I might reverse more often than someone else.

Reversing too soon is the important danger to the technique, because much of the new brood will be killed by being chilled because it is away from the heat of the bee cluster. Think of the imaginary clock: Brood is located in between the lines of 10 - 2 and 7 - 5, and you reverse the bodies. The frames with the brood up to 10-2 where the queen is laying is now in the bottom body and the bees are clustered about her to keep her warm, but the frame with brood that was

down to the 7-5 line is now in the upper body and that brood is close to the inner cover and away from the cluster of bees, so it dies of chill. This mistake is referred to as SPLITTING THE BROOD, and you should remember it. Using the example just given, do not reverse until the brood is located between lines of 11-1 and 8-4 or even better when all the brood is in an upper frame and NO brood in the lower frame.

REVERSING is one of the most valuable techniques used in beekeeping not only helping to prevent swarming, but to aid your bees in building a larger population to enhance your honey yield. However, it is like learning to drive, it takes practice; but I strongly urge everyone who really wants to find the real JOYS OF BEEKEEPING to learn and perform the reversing procedure.

IMIRIE REQUEENING METHOD
(ALMOST FOULPROOF)

Select an exact date for your new queen to arrive and make it known to your queen breeder, and get a MARKED QUEEN. TEN days before the new queen is to arrive, insert queen excluders in between any two boxes where your old queen can go. When your new queen arrives, water her and store her in a cool dark place until needed. Gather up a double screen board, an empty hive body, 10 drawn combs, and a feeder with a gallon of 1:1 sugar syrup. Find the OLD queen (which ever brood box has larva is where the queen will be found) in the colony you want to requeen. Set her ASIDE away from the colony, so that you free to manipulate all the other frames in the colony. Select 3 frames of brood: 1 capped and 2 of eggs and larva, all with the covering nurse bees. Place these in the center of the empty hive body. Now add 6 more frames, as follows: 2 empty drawn comb, (one on each side of the brood frames), 2 frames of pollen and honey, (one on each side of the drawn comb), then 2 more empty drawn comb, (one on each side of the honey-pollen frames). This totals 9 frames leaving space for the queen cage. Now take several frames of brood ...remaining in the old colony...and shake the nurse bees into the new 9 frame nuc. Cover the nuc and set it aside for a while. Return the frame with the OLD queen to her home hive and replace the 5 frames you removed (3 of brood + 2 of honey-pollen) with empty drawn frames

Now put the double screen board on top of the old colony so that its entrance faces to the rear of the parent colony. Set the new 9 frame nuc on top, and install the new queen (make sure you remove the cork from the candy end). Start feeding the new nuc immediately. After about 3-5 days, check the queen cage very quickly using little or no smoke to see if the queen has been released. If she has not, you release her from the cage. Do NOT disturb for another 5-7 days and then check with as little disturbance and smoke as possible tooking for eggs and larva. Add the 10th frame and remove the queen cage. During the next few weeks (I like about 5-6) check the brood pattern of the new queen. If you like it and want to accept that new queen, find the old queen down below the double screen, kill her, and remove the double screen board.

This method has a couple of advantages: 1) if something is wrong with the new queen, you kill her and the colony has a backup with the old queen; and you requeen the colony at a

later date, and 2) for about 5-6 weeks, you have 2 queens laying eggs that increase the number of bees which will make the hive stronger for winter and reduce the stresses of Winter.

Note: If you don't have a Double Screen Board - You should. If you are not sure how it is made, imagine a wooden queen excluder frame without the metal wires, covered on both sides by 8 mesh wire - A DOUBLE SCREEN BOARD. Brushy Mountain Bee Farm in North Carolina makes and sells a fancy, very, nice one.